

## APPENDIX A: STATISTICAL ANALYSIS TABLES

**Appendix 1: Characteristics of landfill leachates with respect to general chemical parameters.**

Landfill		BOD	COD	TSS	NH3N	TOC	TN	pH
2	Mean	1971.0000	6050.0000	570.0000	17.2000	11100.0000	50.0000	8.0700
	N	3	3	3	3	3	3	3
	Std.							
	Deviation	16.46208	44.44097	27.40438	1.73205	1056.42084	6.08276	.02646
	Minimum	1952.00	6015.00	549.00	15.20	9995.00	43.00	8.05
	Maximum	1981.00	6100.00	601.00	18.20	12100.00	54.00	8.10
5	Mean	1120.0000	2371.0000	320.0000	42.2000	247.0000	54.0000	7.2700
	N	3	3	3	3	3	3	3
	Std.							
	Deviation	73.43024	222.71731	22.91288	3.99500	13.00000	5.56776	.07000
	Minimum	1068.00	2120.00	295.00	39.60	239.00	49.00	7.20
	Maximum	1204.00	2545.00	340.00	46.80	262.00	60.00	7.34
6	Mean	171.0000	455.0000	50.0000	2.6000	12.0000	6.0000	6.7600
	N	3	3	3	3	3	3	3
	Std.							
	Deviation	18.35756	33.15117	15.71623	.81854	2.00000	2.00000	.05292
	Minimum	158.00	432.00	39.00	1.90	10.00	4.00	6.70
	Maximum	192.00	493.00	68.00	3.50	14.00	8.00	6.80
7	Mean	369.0000	385.0000	50.0000	10.0000	27.0000	102.0000	7.5400
	N	3	3	3	3	3	3	3
	Std.							
	Deviation	32.96968	12.28821	6.08276	2.64575	4.00000	21.63331	.06000
	Minimum	348.00	376.00	46.00	8.00	23.00	84.00	7.48
	Maximum	407.00	399.00	57.00	13.00	31.00	126.00	7.60
8	Mean	81.0000	165.0000	10.0000	.9400	15.0000	8.0000	7.0200
	N	3	3	3	3	3	3	3
	Std.							
	Deviation	6.24500	16.09348	4.35890	.18735	2.64575	2.64575	.17436
	Minimum	74.00	152.00	7.00	.79	13.00	5.00	6.82
	Maximum	86.00	183.00	15.00	1.15	18.00	10.00	7.14
9	Mean	56.0000	285.0000	130.0000	5.0000	.0000	32.0000	6.2900
	N	3	3	3	3	3	3	3
	Std.							
	Deviation	8.18535	37.24245	13.85641	2.00000	.00000	9.16515	.24759
	Minimum	47.00	256.00	122.00	3.00	.00	24.00	6.10
	Maximum	63.00	327.00	146.00	7.00	.00	42.00	6.57



**Appendix 3: Paired samples test of growth rates of *T. menziesii* and *G. australe* on leachate medium containing 50% leachate with pH adjusted to 6.0 and unadjusted pH at 28±2 °C.**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pen1	3.7233	3	.07767	.04485
	Pen2	2.8667	3	.05774	.03333
Pair 2	Tm1	6.9900	3	.15524	.08963
	Tm2	7.4433	3	.52003	.30024
Pair 3	Ga1	6.1000	3	1.31924	.76166
	Ga2	6.9200	3	.31749	.18330

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pen1 - Pen2	.85667	.13429	.07753	.52308	1.19026	11.049	2	.008
Pair 2	Tm1 - Tm2	-.45333	.36501	.21074	-1.36007	.45341	-2.151	2	.164
Pair 3	Ga1 - Ga2	-.82000	1.33462	.77054	-4.13537	2.49537	-1.064	2	.399

\* 1: Adjusted leachate medium to pH 6.0  
2: Unadjusted leachate medium at pH 8.17

**Appendix 4: Paired samples test of growth rates of *Penicillium* sp., *T. menziesii*, *G. australe* and *P. sanguineus* on MEA with 50% leachate and MEA with 100% leachate at 28° C.**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pen2	2.8667	3	.05774	.03333
	Pen3	2.3233	3	.47899	.27655
Pair 2	Tm2	5.8433	3	.16563	.09563
	Tm3	5.9100	3	1.03504	.59758
Pair 3	Ga2	6.9200	3	.31749	.18330
	Ga3	6.1433	3	.45654	.26359
Pair 4	Ps2	4.1000	3	.10000	.05774
	Ps3	2.8000	3	.59632	.34429

		Paired Differences				t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
					Lower	Upper		
Pair 1	Pen2 - Pen3	.54333	.52386	.30245	-.75802	1.84468	1.796	.214
Pair 2	Tm2 - Tm3	-.06667	.94854	.54764	-2.42298	2.28964	-.122	.914
Pair 3	Ga2 - Ga3	.77667	.69945	.40383	-.96087	2.51420	1.923	.194
Pair 4	Ps2 - Ps3	1.30000	.49960	.28844	.05893	2.54107	4.507	.046

\* 1: 50% leachate medium  
2: 100% leachate medium

**Appendix 5: Raw data of leachate treatment with free cell mycelia of *Ganoderma australe* in batch cultures.**

Treatment		pH	BOD5	COD	NH3N
1	Mean	7.8400	3168.0000	23942.0000	35.2000
	N	3	3	3	3
	Std. Deviation	.02000	13.11488	2133.39448	3.36452
	Minimum	7.82	3154.00	22160.00	31.40
	Maximum	7.86	3180.00	26306.00	37.80
2	Mean	7.6600	6098.0000	23313.0000	28.0000
	N	3	3	3	3
	Std. Deviation	.09644	130.27663	1324.35909	1.96977
	Minimum	7.55	5984.00	22330.00	26.40
	Maximum	7.73	6240.00	24819.00	30.20
3	Mean	6.4600	1272.0000	11533.0000	30.3000
	N	3	3	3	3
	Std. Deviation	.24759	43.55456	926.70761	1.47309
	Minimum	6.18	1225.00	10479.00	28.70
	Maximum	6.65	1311.00	12220.00	31.60
4	Mean	6.7300	1742.0000	17211.0000	22.1000
	N	3	3	3	3
	Std. Deviation	.39950	443.17829	1738.83956	1.90000
	Minimum	6.39	1265.00	15300.00	20.50
	Maximum	7.17	2141.00	18700.00	24.20

**Appendix 6: Percentage removal of leachate treatment with free cell mycelia of *G. australe* in batch cultures.**

Removal	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	3	73.1800	.84870	.49000	71.0717	75.2883	72.20	73.67
2	3	48.9300	1.35632	.78307	45.5607	52.2993	47.37	49.83
3	3	89.3300	.52115	.30089	88.0354	90.6246	88.83	89.87
4	3	85.2833	3.77753	2.18096	75.8994	94.6672	82.13	89.47
Total	12	74.1808	16.53731	4.77391	63.6735	84.6881	47.37	89.87

**Appendix 7: ANOVA test of percentage removal of leachate treatment with free cell mycelia of *G. australe* in batch cultures.**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2974.107	3	991.369	231.882	.000
Within Groups	34.202	8	4.275		
Total	3008.309	11			

**Appendix 8: Post-Hoc test (LSD) of percentage removal of leachate treatment with free cell mycelia of *G. australe* in batch cultures.**

Multiple Comparisons : Dependent Variable: Removal LSD						
(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	24.25000*	1.68826	.000	20.3569	28.1431
	3	-16.15000*	1.68826	.000	-20.0431	-12.2569
	4	-12.10333*	1.68826	.000	-15.9965	-8.2102
2	1	-24.25000*	1.68826	.000	-28.1431	-20.3569
	3	-40.40000*	1.68826	.000	-44.2931	-36.5069
	4	-36.35333*	1.68826	.000	-40.2465	-32.4602
3	1	16.15000*	1.68826	.000	12.2569	20.0431
	2	40.40000*	1.68826	.000	36.5069	44.2931
	4	4.04667*	1.68826	.043	.1535	7.9398
4	1	12.10333*	1.68826	.000	8.2102	15.9965
	2	36.35333*	1.68826	.000	32.4602	40.2465
	3	-4.04667*	1.68826	.043	-7.9398	-.1535

\*. The mean difference is significant at the 0.05 level.

**Appendix 9: Post-Hoc test (Duncan<sup>a</sup> and Waller-Duncan<sup>a,b</sup>) of percentage removal of leachate treatment with free cell mycelia of *G. australe* in batch cultures.**

	Treatment	N	Subset for alpha = 0.05			
			1	2	3	4
Duncan <sup>a</sup>	2	3	48.9300			
	1	3		73.1800		
	4	3			85.2833	
	3	3				89.3300
	Sig.		1.000	1.000	1.000	1.000
Waller-Duncan <sup>a,b</sup>	2	3	48.9300			
	1	3		73.1800		
	4	3			85.2833	
	3	3			89.3300	

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

b. Type 1/Type 2 Error Seriousness Ratio = 100.

1: SLM-50 (sterilized medium with 50% leachate); 2: SLM-100 (sterilized medium of 100% leachate); 3: LM-50 (unsterilized medium with 50% leachate); and 3: LM-100 (unsterilized medium of 100% leachate).

**Appendix 10: Raw data of leachate treatment with free cell mycelia of *Trametes menziesii* in batch cultures.**

Treatment		pH	BOD5	COD	NH3N
1	Mean	7.7500	5861.0000	22897.0000	63.1600
	N	3	3	3	3
	Std. Deviation	.19975	65.02307	3076.77217	8.81684
	Minimum	7.53	5795.00	19991.00	56.25
	Maximum	7.92	5925.00	26120.00	73.09
2	Mean	7.8000	4396.0000	16233.0000	36.6000
	N	3	3	3	3
	Std. Deviation	.17000	221.73858	580.56266	4.45421
	Minimum	7.63	4140.00	15772.00	32.60
	Maximum	7.97	4528.00	16885.00	41.40
3	Mean	6.1700	1600.0000	6665.0000	31.7200
	N	3	3	3	3
	Std. Deviation	.11269	313.20920	224.22087	2.05796
	Minimum	6.10	1390.00	6420.00	30.00
	Maximum	6.30	1960.00	6860.00	34.00
4	Mean	7.3100	2204.0000	14316.0000	25.6800
	N	3	3	3	3
	Std. Deviation	.84071	245.49542	1972.04158	.97324
	Minimum	6.37	1922.00	12850.00	25.04
	Maximum	7.99	2370.00	16558.00	26.80

1: SLM-50 (sterilized medium with 50% leachate); 2: SLM-100 (sterilized medium of 100% leachate); 3: LM-50 (unsterilized medium with 50% leachate); and 3: LM-100 (unsterilized medium of 100% leachate).

**Appendix 11: Percentage removal of leachate treatment with free cell mycelia of *T. menziesii* in batch cultures.**

**Descriptives**

Removal								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	3	50.3800	1.88650	1.08917	45.6937	55.0663	48.21	51.63
2	3	63.6533	1.96001	1.13161	58.7844	68.5223	61.69	65.61
3	3	86.1400	2.85795	1.65004	79.0404	93.2396	82.87	88.16
4	3	81.3867	2.23505	1.29040	75.8345	86.9388	79.93	83.96
Total	12	70.3900	15.03161	4.33925	60.8394	79.9406	48.21	88.16

1: SLM-50 (sterilized medium with 50% leachate); 2: SLM-100 (sterilized medium of 100% leachate); 3: LM-50 (unsterilized medium with 50% leachate); and 3: LM-100 (unsterilized medium of 100% leachate).

**Appendix 12: ANOVA test of percentage removal of leachate treatment with free cell mycelia of *T. menziesii* in batch cultures.**

**ANOVA**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2444.316	3	814.772	158.486	.000
Within Groups	41.128	8	5.141		
Total	2485.444	11			

1: SLM-50 (sterilized medium with 50% leachate); 2: SLM-100 (sterilized medium of 100% leachate); 3: LM-50 (unsterilized medium with 50% leachate); and 3: LM-100 (unsterilized medium of 100% leachate).

**Appendix 13: Post-Hoc test (LSD) of percentage removal of leachate treatment with free cell mycelia of *T. menziesii* in batch cultures.**

Multiple Comparisons						
Dependent Variable: Removal						
	(I)	(J)	Mean Difference	Std. Error	Sig.	95% Confidence Interval
	Treatment	Treatment	(I-J)			Lower Bound Upper Bound
LSD	1	2	-13.27333*	1.85130	.000	-17.5424 -9.0042
		3	-35.76000*	1.85130	.000	-40.0291 -31.4909
		4	-31.00667*	1.85130	.000	-35.2758 -26.7376
	2	1	13.27333*	1.85130	.000	9.0042 17.5424
		3	-22.48667*	1.85130	.000	-26.7558 -18.2176
		4	-17.73333*	1.85130	.000	-22.0024 -13.4642
	3	1	35.76000*	1.85130	.000	31.4909 40.0291
		2	22.48667*	1.85130	.000	18.2176 26.7558
		4	4.75333*	1.85130	.033	.4842 9.0224
	4	1	31.00667*	1.85130	.000	26.7376 35.2758
		2	17.73333*	1.85130	.000	13.4642 22.0024
		3	-4.75333*	1.85130	.033	-9.0224 -.4842

\*. The mean difference is significant at the 0.05 level.

1: SLM-50 (sterilized medium with 50% leachate); 2: SLM-100 (sterilized medium of 100% leachate); 3: LM-50 (unsterilized medium with 50% leachate); and 3: LM-100 (unsterilized medium of 100% leachate).

**Appendix 14: Post-Hoc test (Duncan<sup>a</sup> and Waller-Duncan<sup>a,b</sup>) of percentage removal of leachate treatment with free cell mycelia of *T. menziesii* in batch cultures.**

			Subset for alpha = 0.05			
	Treatment	N				
			1	2	3	4
Duncan <sup>a</sup>	1	3	50.3800			
	2	3		63.6533		
	4	3			81.3867	
	3	3				86.1400
	Sig.		1.000	1.000	1.000	1.000
Waller-Duncan <sup>a,b</sup>	1	3	50.3800			
	2	3		63.6533		
	4	3			81.3867	
	3	3				86.1400
	Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

b. Type 1/Type 2 Error Seriousness Ratio = 100.

1: SLM-50 (sterilized medium with 50% leachate); 2: SLM-100 (sterilized medium of 100% leachate); 3: LM-50 (unsterilized medium with 50% leachate); and 3: LM-100 (unsterilized medium of 100% leachate).

**Appendix 15: Percentage removal of 100% and 50% leachate BOD<sub>5</sub>, COD, NH<sub>3</sub>-N and pH changes by *G. australe* immobilized on Ecomat at weekly intervals for 28 days incubated at room temperature, shaking at 150 rpm.**

**100% leachate**

Day		pH	BOD5	COD	NH3N
14	Mean	8.9900	1035.0400	10228.4300	28.8700
	Std. Deviation	.12767	97.98143	119.15952	.54286
	Std. Error of Mean	.07371	56.56961	68.79678	.31342
	Minimum	8.85	946.57	10145.25	28.25
	Maximum	9.10	1140.35	10364.94	29.26
	N	3	3	3	3
21	Mean	9.0700	988.1300	11433.4400	36.3300
	Std. Deviation	.14799	27.85934	503.21665	.75386
	Std. Error of Mean	.08544	16.08460	290.53227	.43524
	Minimum	8.90	969.44	11085.66	35.87
	Maximum	9.17	1020.15	12010.46	37.20
	N	3	3	3	3
28	Mean	9.2000	739.3700	11186.0800	24.9000
	Std. Deviation	.05568	13.14344	733.80203	1.81865
	Std. Error of Mean	.03215	7.58837	423.66080	1.05000
	Minimum	9.14	724.32	10606.45	22.95
	Maximum	9.25	748.59	12011.14	26.55
	N	3	3	3	3
7	Mean	8.9100	1511.4600	11145.6000	25.9700
	Std. Deviation	.13528	20.07967	898.81125	1.06099
	Std. Error of Mean	.07810	11.59300	518.92892	.61256
	Minimum	8.77	1492.04	10315.88	24.85
	Maximum	9.04	1532.14	12100.40	26.96
	N	3	3	3	3

**Appendix 16: Percentage removal of 100% and 50% leachate BOD<sub>5</sub>, COD, NH<sub>3</sub>-N and pH changes by *G. australe* immobilized on Ecomat at weekly intervals for 28 days incubated at room temperature, shaking at 150 rpm.**

**50% leachate**

Day		pH	BOD5	COD	NH3N
7	Mean	8.9300	3093.3200	9066.4400	20.5000
	N	3	3	3	3
	Std. Deviation	.19975	80.08447	157.78301	1.41206
	Std. Error of Mean	.11533	46.23679	91.09607	.81525
	Minimum	8.76	3008.32	8931.98	19.53
	Maximum	9.15	3167.36	9240.14	22.12
14	Mean	8.9200	2131.6600	8384.6000	26.8700
	N	3	3	3	3
	Std. Deviation	.11269	61.16830	54.40782	1.10077
	Std. Error of Mean	.06506	35.31553	31.41237	.63553



21	Minimum	8.85	2084.16	8322.72	25.60
	Maximum	9.05	2200.68	8424.94	27.55
	Mean	8.9100	1965.1000	7769.8800	37.6700
	N	3	3	3	3
	Std. Deviation	.04583	67.95118	34.95555	.85983
	Std. Error of Mean	.02646	39.23163	20.18160	.49642
	Minimum	8.86	1889.64	7749.26	36.68
	Maximum	8.95	2021.45	7810.24	38.23
	Mean	8.7500	1942.8900	6881.5300	29.8200
	N	3	3	3	3
28	Std. Deviation	.06245	218.94555	38.60005	1.28265
	Std. Error of Mean	.03606	126.40827	22.28575	.74054
	Minimum	8.70	1694.69	6845.26	28.80
	Maximum	8.82	2108.64	6922.10	31.26

**Appendix 17: Percentage removal of 100% leachate BOD<sub>5</sub>, COD, NH<sub>3</sub>-N and pH changes by immobilized *T. menziesii* on Ecomat at weekly intervals for 28 days incubated at room temperature, shaking at 150 rpm.**

Day		pH	BOD5	COD	NH3N
14	Mean	9.1600	1390.0000	14390.0000	17.0000
	N	3	3	3	3
	Std. Deviation	.13528	41.03657	62.44998	1.51327
	Minimum	9.03	1350.00	14320.00	15.30
	Maximum	9.30	1432.00	14440.00	18.20
	Mean	9.2300	1251.6700	12960.0000	28.3300
21	N	3	3	3	3
	Std. Deviation	.18358	54.34020	474.44705	1.59239
	Minimum	9.10	1190.50	12420.00	26.50
	Maximum	9.44	1294.36	13310.00	29.40
	Mean	9.3800	736.6700	15790.0000	39.9000
	N	3	3	3	3
28	Std. Deviation	.26230	12.47272	246.82180	2.45611
	Minimum	9.10	725.45	15526.00	37.25
	Maximum	9.62	750.10	16015.00	42.10
	Mean	8.8200	2028.0000	11000.0000	23.4700
	N	3	3	3	3
	Std. Deviation	.37470	97.04123	991.36270	.79605
7	Minimum	8.40	1919.00	10040.00	22.80
	Maximum	9.12	2105.00	12020.00	24.35

**Appendix 18: Percentage removal of 100% leachate BOD<sub>5</sub>, COD, NH<sub>3</sub>-N and pH changes by coculture mycelia of immobilized *G. australe* and *T. menziesii* after treatment for 28 days, incubated at room temperature, shaking at 150 rpm.**

Day		pH	BOD5	COD	NH3N
14	Mean	9.1200	7706.5400	15121.3200	61.1300
	N	3	3	3	3

	Std. Deviation	.61221	1522.03622	2017.74173	6.58628
	Minimum	8.54	6016.40	13711.18	54.14
	Maximum	9.76	8968.94	17432.60	67.22
	Mean	9.0400	3547.0000	15112.6900	58.8800
	N	3	3	3	3
21	Std. Deviation	.51884	170.27331	1987.72002	4.25549
	Minimum	8.62	3390.00	13277.69	54.22
	Maximum	9.62	3728.00	17224.18	62.56
	Mean	9.1200	3230.7700	10501.1100	82.7100
	N	3	3	3	3
28	Std. Deviation	.21656	239.83392	1712.21136	5.25097
	Minimum	8.89	2985.24	8952.99	78.65
	Maximum	9.32	3464.47	12340.14	88.64
	Mean	8.8600	15153.3000	15229.3500	30.3800
	N	3	3	3	3
3	Std. Deviation	.12166	1019.60840	2045.36816	4.43003
	Minimum	8.78	14305.30	13045.60	27.20
	Maximum	9.00	16284.60	17100.30	35.44
	Mean	8.9700	12225.6800	9151.3000	56.7000
	N	3	3	3	3
7	Std. Deviation	.21932	1396.73714	810.18241	11.10584
	Minimum	8.78	10882.14	8624.28	48.60
	Maximum	9.21	13670.14	10084.20	69.36

**Appendix 19: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in raw leachate (100%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

Cycle		pH	BOD5	COD	NH3N
10	Mean	8.2800	3440.0000	2625.0000	23.6000
	N	3	3	3	3
	Std. Deviation	.07211	36.05551	13.22876	1.85000
	Minimum	8.20	3400.00	2610.00	21.95
	Maximum	8.34	3470.00	2635.00	25.60
	Mean	8.0700	3495.0000	3175.0000	29.2000
	N	3	3	3	3
2	Std. Deviation	.02646	5.00000	8.66025	1.03923
	Minimum	8.05	3490.00	3165.00	28.60
	Maximum	8.10	3500.00	3180.00	30.40
	Mean	8.1100	3175.0000	3080.0000	27.4000
	N	3	3	3	3
4	Std. Deviation	.12288	13.22876	26.45751	.72111
	Minimum	7.97	3160.00	3060.00	26.80
	Maximum	8.20	3185.00	3110.00	28.20
	Mean	8.1500	3485.0000	3210.0000	16.4000
6	N	3	3	3	3
	Std. Deviation	.21794	26.45751	8.66025	.13229

	Minimum	7.90	3465.00	3205.00	16.30
	Maximum	8.30	3515.00	3220.00	16.55
	Mean	8.2200	3495.0000	3350.0000	18.6000
	N	3	3	3	3
8	Std. Deviation	.03606	27.83882	32.78719	.24249
	Minimum	8.18	3470.00	3320.00	18.34
	Maximum	8.25	3525.00	3385.00	18.82

**Appendix 20: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in raw leachate (100%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

**1) Control-raw (100%) - Cycle 1**

BOD<sub>5</sub>

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3490.0000	3	5.00000	2.88675
	Raw	3495.0000	3	18.02776	10.40833

Paired Samples Test								
		Mean	Std.	Std. Error	95% Confidence Interval of the Difference		t	Sig. (2-tailed)
			Deviation	Mean	Lower	Upper		
Pair 1	Control - Raw	-5.00000	22.91288	13.22876	-61.91875	51.91875	-.378	.742

COD

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3250.0000	3	26.45751	15.27525
	Raw	3175.0000	3	8.66025	5.00000

Paired Samples Test								
		Mean	Std.	Std. Error	95% Confidence Interval of the Difference		t	Sig. (2-tailed)
			Deviation	Mean	Lower	Upper		
Pair 1	Control - Raw	75.00000	25.00000	14.43376	12.89656	137.10344	5.196	.035

NH<sub>3</sub>N

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	26.6000	3	.72111	.41633
	Raw	29.2000	3	1.03923	.60000

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	-2.60000	.72111	.41633	-4.39134	-.80866	-6.245	2	.025

pH

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	8.0600	3	.01732	.01000
	Raw	8.0700	3	.02646	.01528

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	-.01000	.04359	.02517	-.11828	.09828	-.397	2	.729

**Appendix 21: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in raw leachate (100%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

**Control-raw (100%) - Cycle 2**

BOD<sub>5</sub>

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3475.0000	3	10.00000	5.77350
	Raw	3470.0000	3	5.00000	2.88675

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	5.00000	15.00000	8.66025	-32.26207	42.26207	.577	2	.622

COD

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3580.0000	3	26.45751	15.27525
	Raw	3080.0000	3	26.45751	15.27525

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	500.00000	17.32051	10.00000	456.97347	543.02653	50.000	2	.000

NH<sub>3</sub>N

Paired Samples Statistics				
		Mean	N	Std. Deviation
Pair 1	Control	27.1000	3	.43589
	Raw	27.4000	3	.72111

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	-.30000	1.05357	.60828	-2.91720	2.31720	-.493	2	.671

pH

Paired Samples Statistics				
		Mean	N	Std. Deviation
Pair 1	Control	8.1400	3	.02646
	Raw	8.1100	3	.12288

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	.03000	.13748	.07937	-.31151	.37151	.378	2	.742

**Appendix 22: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in raw leachate (100%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

**Control-raw (100%) - Cycle 3**

BOD<sub>5</sub>

Paired Samples Statistics				
		Mean	N	Std. Deviation
Pair 1	Control	3480.0000	3	10.00000
	Raw	3485.0000	3	8.66025

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	5.00000	15.00000	8.66025	-32.26207	42.26207	.577	2	.622

COD

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3270.0000	3	32.78719	18.92969
	Raw	3210.0000	3	8.66025	5.00000

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	60.00000	40.00000	23.09401	-39.36551	159.36551	2.598	2	.122

NH<sub>3</sub>N

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	22.2000	3	.70000	.40415
	Raw	16.4000	3	.13229	.07638

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	5.80000	.77942	.45000	3.86381	7.73619	12.889	2	.006

pH

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	8.2000	3	.08660	.05000
	Raw	8.1500	3	.21794	.12583

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	.05000	.20000	.11547	-.44683	.54683	.433	2	.707

**Appendix 23: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in raw leachate (100%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

**Control-raw (100%) - Cycle 4**

BOD<sub>5</sub>

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3470.0000	3	5.00000	2.88675
	Raw	3495.0000	3	17.32051	10.00000

Paired Samples Test									
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Control - Raw	-25.00000	21.79449	12.58306	-79.14053	29.14053	-1.987	2	.185

COD

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3240.0000	3	8.66025	5.00000
	Raw	3350.0000	3	32.78719	18.92969

Paired Samples Test									
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Control - Raw	-110.00000	40.00000	23.09401	-209.36551	-10.63449	-4.763	2	.041

NH<sub>3</sub>N

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	30.9000	3	1.96723	1.13578
	Raw	18.6000	3	.24249	.14000

Paired Samples Test									
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Control - Raw	12.30000	2.09685	1.21062	7.09112	17.50888	10.160	2	.010

pH

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	8.2900	3	.12767	.07371
	Raw	8.2200	3	.03606	.02082

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-
		Mean	Std.	Std. Error	95% Confidence Interval of				tailed)
			Deviation	Mean	the Difference				
					Lower	Upper			
Pair 1	Control - Raw	.07000	.14799	.08544	-.29762	.43762	.819	2	.499

**Appendix 24: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in raw leachate (100%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

**Control-raw (100%) - Cycle 5**

BOD<sub>5</sub>

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3500.0000	3	86.74676	50.08326
	Raw	3440.0000	3	17.32051	10.00000

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-
		Mean	Std.	Std. Error	95% Confidence Interval of				tailed)
			Deviation	Mean	the Difference				
					Lower	Upper			
Pair 1	Control - Raw	60.00000	78.58117	45.36886	-135.20644	255.20644	1.322	2	.317

COD

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3400.0000	3	13.22876	7.63763
	Raw	2625.0000	3	13.22876	7.63763

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	775.00000	26.45751	15.27525	709.27589	840.72411	50.736	2	.000

NH<sub>3</sub>N

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean



Pair 1	Control	29.9000	3	1.21244	.70000
	Raw	23.6000	3	1.85000	1.06810

#### Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	6.30000	2.03899	1.17721	1.23486	11.36514	5.352	2	.033

pH

#### Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	8.3500	3	.22913	.13229
	Raw	8.2800	3	.07211	.04163

#### Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Raw	.07000	.16643	.09609	-.34344	.48344	.728	2	.542

**Appendix 25: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in raw leachate (100%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

#### 2) Control- diluted (50%) - Cycle 1

BOD<sub>5</sub>

#### Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3490.0000	3	5.00000	2.88675
	Diluted	3505.0000	3	8.66025	5.00000

#### Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	-15.00000	5.00000	2.88675	-27.42069	-2.57931	-5.196	2	.035

COD

#### Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3250.0000	3	26.45751	15.27525
	Diluted	2705.0000	3	13.22876	7.63763

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	545.00000	22.91288	13.22876	488.08125	601.91875	41.198	2	.001

NH<sub>3</sub>N

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	26.6000	3	.72111	.41633
	Diluted	16.0000	3	1.21244	.70000

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	10.60000	1.49332	.86217	6.89039	14.30961	12.295	2	.007

pH

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	8.0600	3	.01732	.01000
	Diluted	8.0100	3	.02646	.01528

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	.05000	.04359	.02517	-.05828	.15828	1.987	2	.185

**Appendix 26: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in raw leachate (100%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

**Control- diluted (50%) - Cycle 2**

BOD<sub>5</sub>

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3475.0000	3	10.00000	5.77350
	Diluted	3525.0000	3	8.66025	5.00000

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	-50.00000	18.02776	10.40833	-94.78343	-5.21657	-4.804	2	.041

COD

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3580.0000	3	26.45751	15.27525
	Diluted	2530.0000	3	18.02776	10.40833

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	1050.00000	42.72002	24.66441	943.87759	1156.12241	42.571	2	.001

NH<sub>3</sub>N

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	27.1000	3	.43589	.25166
	Diluted	25.8000	3	2.10000	1.21244

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	1.30000	1.93132	1.11505	-3.49767	6.09767	1.166	2	.364

pH

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	8.1400	3	.02646	.01528
	Diluted	8.0600	3	.12490	.07211

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	.08000	.13000	.07506	-.24294	.40294	1.066	2	.398

**Appendix 27: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in raw leachate (100%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

**Control- diluted (50%) - Cycle 3**

BOD<sub>5</sub>

Paired Samples Statistics									
		Mean	N	Std. Deviation		Std. Error Mean			
Pair 1	Control	3475.0000	3	10.00000		5.77350			
	Diluted	3525.0000	3	8.66025		5.00000			
Paired Samples Test									
		Paired Differences					t	df	Sig. (2-
		Mean	Std.	Std. Error	95% Confidence Interval of		tailed)		
			Deviation	Mean	the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	-50.00000	18.02776	10.40833	-94.78343	-5.21657	-4.804	2	.041

COD

Paired Samples Statistics									
		Mean	N	Std. Deviation			Std. Error Mean		
Pair 1	Control	3270.0000	3	32.78719			18.92969		
	Diluted	2050.0000	3	18.02776			10.40833		
Paired Samples Test									
		Paired Differences					t	df	Sig. (2-
		Mean	Std.	Std. Error	95% Confidence Interval of		tailed)		
			Deviation	Mean	the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	1220.00000	35.00000	20.20726	1133.05518	1306.94482	60.374	2	.000

NH<sub>3</sub>N

Paired Samples Statistics									
		Mean	N	Std. Deviation		Std. Error Mean			
Pair 1	Control	22.2000	3	.70000		.40415			
	Diluted	15.0000	3	.91652		.52915			
Paired Samples Test									
		Paired Differences					t	df	Sig. (2-
		Mean	Std.	Std. Error	95% Confidence Interval of		tailed)		
		Deviation		Mean	the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	7.20000	1.47309	.85049	3.54064	10.85936	8.466	2	.014

pH

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	8.2000	3	.08660	.05000
	Diluted	8.0800	3	.14731	.08505

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	.12000	.22068	.12741	-.42820	.66820	.942	2	.446

**Appendix 28: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in raw leachate (100%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

**Control- diluted (50%) - Cycle 4**

BOD<sub>5</sub>

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3470.0000	3	5.00000	2.88675
	Diluted	3505.0000	3	13.22876	7.63763

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	-35.00000	18.02776	10.40833	-79.78343	9.78343	-3.363	2	.078

COD

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3240.0000	3	8.66025	5.00000
	Diluted	2080.0000	3	13.22876	7.63763

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control - Diluted	1160.00000	21.79449	12.58306	1105.85947	1214.14053	92.187	2	.000

NH<sub>3</sub>N

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	30.9000	3	1.96723	1.13578
	Diluted	16.7000	3	1.21244	.70000

Paired Samples Test									
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Control - Diluted	14.20000	3.17962	1.83576	6.30138	22.09862	7.735	2	.016

pH

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	8.2900	3	.12767	.07371
	Diluted	8.1300	3	.08888	.05132

Paired Samples Test									
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Control - Diluted	.16000	.15395	.08888	-.22243	.54243	1.800	2	.214

**Appendix 29: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in raw leachate (100%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

**Control- diluted (50%) - Cycle 5**  
BOD<sub>5</sub>

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3500.0000	3	86.74676	50.08326
	Diluted	3510.0000	3	8.66025	5.00000

Paired Samples Test									
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Control - Diluted	-10.00000	95.39392	55.07571	-246.97163	226.97163	-.182	2	.873

COD

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	3400.0000	3	13.22876	7.63763
	Diluted	1645.0000	3	8.66025	5.00000

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
					Mean	Lower	Upper		
Pair 1	Control - Diluted	1755.00000	20.00000	11.54701	1705.31725	1804.68275	151.987	2	.000

NH<sub>3</sub>N

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	29.9000	3	1.21244	.70000
	Diluted	23.8000	3	1.24900	.72111

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
					Mean	Lower	Upper		
Pair 1	Control - Diluted	6.10000	2.44336	1.41067	.03036	12.16964	4.324	2	.050

pH

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Control	8.3500	3	.22913	.13229
	Diluted	8.1200	3	.11790	.06807

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
					Mean	Lower	Upper		
Pair 1	Control - Diluted	.23000	.33151	.19140	-.59352	1.05352	1.202	2	.352

**Appendix 30: Percentage removal of BOD<sub>5</sub>, COD, NH<sub>3</sub>N and pH changes in diluted leachate (50%) after treatment by Ecomat-immobilized *G. australe* in column packing at room temperature.**

Cycle		pH	BOD <sub>5</sub>	COD	NH <sub>3</sub> N
10	Mean	8.1200	3510.0000	1645.0000	23.8000
	N	3	3	3	3
	Std. Deviation	.11790	8.66025	8.66025	1.24900

	Minimum	7.99	3505.00	1640.00	22.80
	Maximum	8.22	3520.00	1655.00	25.20
	Mean	8.0100	3505.0000	2705.0000	16.0000
	N	3	3	3	3
2	Std. Deviation	.02646	31.22499	13.22876	1.21244
	Minimum	7.99	3480.00	2690.00	14.90
	Maximum	8.04	3540.00	2715.00	17.30
	Mean	8.0600	3525.0000	2530.0000	25.8000
	N	3	3	3	3
4	Std. Deviation	.12490	8.66025	18.02776	2.10000
	Minimum	7.92	3520.00	2510.00	23.40
	Maximum	8.16	3535.00	2545.00	27.30
	Mean	8.0800	3510.0000	2050.0000	15.0000
	N	3	3	3	3
6	Std. Deviation	.14731	8.66025	18.02776	.91652
	Minimum	7.95	3500.00	2035.00	14.20
	Maximum	8.24	3515.00	2070.00	16.00
	Mean	8.1300	3505.0000	2080.0000	16.7000
	N	3	3	3	3
8	Std. Deviation	.08888	13.22876	13.22876	1.21244
	Minimum	8.03	3490.00	2065.00	15.60
	Maximum	8.20	3515.00	2090.00	18.00

**Appendix 31: Raw data of activity of enzymes in extract and crude enzyme of *G. australe* incubated at room temperature, agitated at 150 rpm for four days.**

	LiP1	LiP2	MnP1	MnP2	Laccase	Laccase	Protease	Protease	Lipase	Lipase
					1	2	1	2	1	2
Mean	.1233	3.6600	1.7500	1.7500	.2000	.1000	13.2000	14.6000	1.0433	.5450
N	3	3	2	2	2	2	3	2	3	2
Std. Deviation	.23629	2.18534	.35355	.35355	.84853	.42426	.40000	1.97990	.13503	.20506
Minimum	-.06	1.15	1.50	1.50	-.40	-.20	12.80	13.20	.91	.40
Maximum	.39	5.14	2.00	2.00	.80	.40	13.60	16.00	1.18	.69

**Appendix 32: Paired samples t-test of activity of enzymes in extract and crude enzyme of *G. australe* incubated at room temperature, agitated at 150 rpm for four days.**

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	LiP1 - LiP2	-3.53667	2.10155	1.21333	-8.75722	1.68389	-2.915	2	.100
Pair 2	Laccase1 - Laccase2	.10000	1.27279	.90000	-11.33558	11.53558	.111	1	.930



Pair 3	Protease1 - Protease2	-1.40000	2.54558	1.80000	-24.27117	21.47117	-.778	1	.579
Pair 4	Lipase1 - Lipase2	.50000	.39598	.28000	-3.05774	4.05774	1.786	1	.325

**Appendix 33: Treatment efficiencies for BOD<sub>5</sub>, COD, NH<sub>3</sub>-N and pH by crude enzymes of *G. australe* after incubated on an orbital shaker at 80 rpm with different concentrations of crude enzyme for 24 hours.**

Treatment	pH	BOD5	COD	NH3N
1	Mean	6.4600	3264.0000	78.4200
	N	3	3	3
	Std. Deviation	.03606	2.00000	.01732
	Minimum	6.42	3262.00	78.40
	Maximum	6.49	3266.00	78.43
	Mean	6.4700	3282.8000	29.4000
2	N	3	3	3
	Std. Deviation	.59557	176.10982	4.39204
	Minimum	5.86	3096.20	25.40
	Maximum	7.05	3446.10	34.10
	Mean	6.4500	3241.4000	26.9000
	N	3	3	3
3	Std. Deviation	.30265	125.91997	2.36432
	Minimum	6.21	3096.20	24.40
	Maximum	6.79	3320.60	29.10
	Mean	6.5300	3301.0000	36.3000
	N	3	3	3
	Std. Deviation	.16823	154.78346	2.28515
4	Minimum	6.40	3176.20	34.80
	Maximum	6.72	3474.20	38.93

1: 0 U/ml; 2: 5 U/ml; 3: 10 U/ml; and 4: 20 U/ml

**Appendix 34: ANOVA test for BOD<sub>5</sub>, by crude enzymes of *G. australe* after incubated on an orbital shaker at 80 rpm with different concentrations of crude enzyme for 24 hours.**

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5872.920	3	1957.640	.111	.952
Within Groups	141664.860	8	17708.108		
Total	147537.780	11			

**Appendix 35: ANOVA test for COD by crude enzymes of *G. australe* after incubated on an orbital shaker at 80 rpm with different concentrations of crude enzyme for 24 hours.**

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	85039360.086	3	28346453.362	2217.428	.000
Within Groups	102267.852	8	12783.481		

Total	85141627.937	11
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**Appendix 36: ANOVA test for NH<sub>3</sub>-N by crude enzymes of *G. australe* after incubated on an orbital shaker at 80 rpm with different concentrations of crude enzyme for 24 hours.**

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5230.189	3	1743.396	231.664	.000
Within Groups	60.204	8	7.526		
Total	5290.393	11			

**Appendix 37: ANOVA test for pH by crude enzymes of *G. australe* after incubated on an orbital shaker at 80 rpm with different concentrations of crude enzyme for 24 hours.**

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.012	3	.004	.033	.991
Within Groups	.952	8	.119		
Total	.963	11			

**Appendix 38: Treatment efficiencies for BOD<sub>5</sub>, COD, NH<sub>3</sub>-N and pH by crude enzymes of *G. australe* after incubated on an orbital shaker at 80 rpm with 10 U/ml of crude enzyme at different time exposure.**

Treatment		pH	BOD5	COD	NH3N
1	Mean	6.4600	3284.7700	724.0400	30.3000
	N	3	3	3	3
	Std. Deviation	.14177	105.64107	54.78252	3.24191
	Minimum	6.35	3214.00	682.80	27.40
	Maximum	6.62	3406.20	786.20	33.80
2	Mean	6.5400	3289.0100	362.0200	29.7000
	N	3	3	3	3
	Std. Deviation	.25534	186.59162	24.55730	2.29129
	Minimum	6.32	3095.20	342.40	27.70
	Maximum	6.82	3467.43	389.56	32.20
3	Mean	6.4500	3241.0900	1014.0500	28.0800
	N	3	3	3	3
	Std. Deviation	.25239	148.00187	96.81468	3.21173
	Minimum	6.28	3143.67	939.25	25.40
	Maximum	6.74	3411.40	1123.40	31.64

1: 4 hrs 2: 8 hrs; 3: 24 hrs

**Appendix 39: ANOVA test for pH by crude enzymes of *G. australe* after incubated on an orbital shaker at 80 rpm with 10 U/ml of crude enzyme at different time exposure.**

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.015	2	.007	.147	.866
Within Groups	.298	6	.050		
Total	.313	8			

**Appendix 40: Treatment efficiencies for BOD<sub>5</sub>, COD, NH<sub>3</sub>-N and pH after incubated with immobilized *G. australe* on ecomat incubated at room temperature for 7 days, shaking at 150 rpm and with 10 U/ml of crude enzyme at 4 hours time exposure on an orbital shaker at 80 rpm.**

Treatment		pH	BOD5	COD	NH3N
1	Mean	9.1100	2068.0000	4075.0000	43.2000
	N	3	3	3	3
	Std. Deviation	.72395	424.78612	207.74744	5.24309
	Minimum	8.50	1601.50	3837.00	39.50
	Maximum	9.91	2432.50	4220.00	49.20
	Mean	8.8700	1730.0000	2570.0000	11.7000
2	N	3	3	3	3
	Std. Deviation	.73750	131.14877	126.29727	3.60875
	Minimum	8.29	1590.00	2484.00	9.05
	Maximum	9.70	1850.00	2715.00	15.81

1: Treated with immobilized *G. australe* on ecomat incubated at room temperature for 7 days, shaking at 150 rpm;

2: Treated with 10 U/ml of crude enzyme at 4 hours time exposure on an orbital shaker at 80 rpm